A Development Process of X-Ray Films For True Light Photography

The resurgence of Large Format chemical photography is on the “up-swing”. However - the cost of available film is just about out of range for the common everyday working person. Not to mention the “*struggling artist*”. There are alternatives, however. There are other types of “light sensative materials” out there to be had to produce your photographic art. By far the most cost effective is the “Paper Negative Process”. This 180+ year old process was one of the firsts. 1838 in Great Britain a fellow by the name of William Henry Fox Talbot discovered this process, whereby mutable copies could be made from a single negative. - The rest is history.

The use of X-Ray films are next of a more cost effective way to create a negative latent image. And like the paper negative, must be processed with the use of chemicals, and in a “darkroom” with a “safelight” of RED in color. Along with the paper process, “tintypes”, wet-plate, ambrotype, calotypes, and X-Ray films are, by their nature, “orthochromatic”. Meaning that these are NOT sensitive to the full spectrum of available light. They are, however, sensitive to colors of green and blue - as well as ultraviolet.

This essay (article) is about how I go about creating a photographic X-Ray negative.

First off - Let us take a look at the most available X-Ray films that may be had from e-Bay. (Of course you might ask your doctor, or local hospital if they have any leftover X-Ray film that they are dumping in the trash. As most - if not all - medical establishments are going over to digital X-Ray machines.) As of the date of this writing, the prices will vary from 20 dollars to 100 dollars for a box of 100 sheets of eight by ten films. And there are “Green” and “Blue”. The green type has an ISO of 50 to 100. Where as the blue is ISO 25 to 50. These films can be used for true light photographic work.

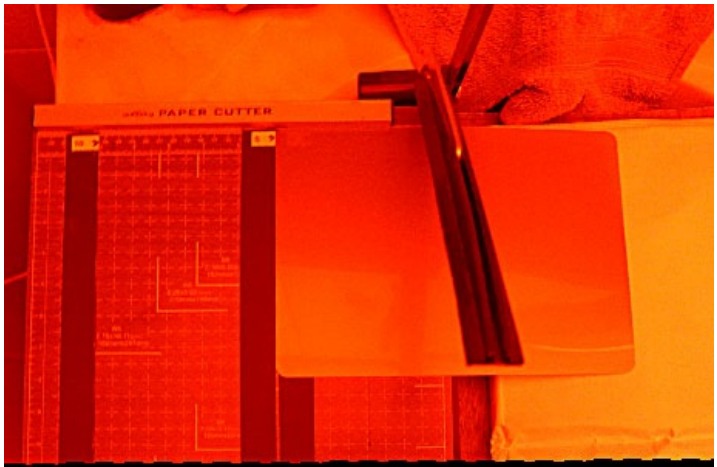
When I began to use X-Ray film in a large format (4"X5") camera I had to buy films that were 8"X10" and some a bit larger. As you too will find, the films need to be cut to fit the holders you have. However - the UPSIDE to this is that when you do purchase a 8"X10" box of 100 sheets for, say, 40 bucks - You will cut the sheets to end up with a total of 400 - Four by Five inch parts of usable film. That is about 10 Cents for every negative you shoot. (As compared to 8 to 10 dollars each for a true film. Yeah! I know - that IS a lot of savings - perhaps to use on other needed photographic gear.)

Cutting the 8"X10" Film sheets into 4X5 usable Parts:

Needed Materials:

1.) Box of X-Ray Film. (Duh!)
2.) “Paper Cutter” With a ruler scale on it.
3.) Safe Lit Darkroom area (RED LIGHT) - LED’s are OK IF you KNOW that these are SAFE.
4.) Disposable Gloves for hands. (Keeps fingerprints from the emulsion.)

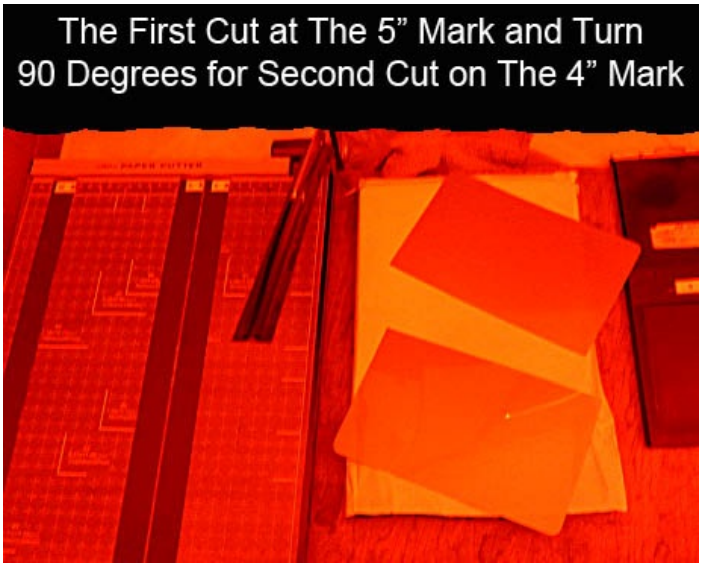
Get All Things Set Up in Normal Light.
Easy to Find and Well Placed.
Turn off the Light - and Turn On Safelight.



Take ONE sheet of Film and Place On The
Cutting board at The 5” Mark.

With the SAFELIGHT ON open the box of film, and open the paper envelope or plastic “bag” - Take care as not to handle the film with bare hands, do NOT drop the film as you take it from the box onto the cutting board. (Take Note that I have placed “Gaffer’s Tape” at measured places on the cutting board. I did this for easy reference as to where to place the Left side of the Film to that tape, in order to get a good and proper measured cut from each cutting.)

One more thing about the use of X-Ray Films.... You can NOT get the emulsion side reversed. X-Ray Films are Double-Sided Emulsion Coated.



I shall skip the use of the camera and exposure settings as that is covered in another article, and, of course, other written works that may be found online. I will mention the depending on the type of X-Ray film you are using, it is best to use a ISO rating of 50 -100 with “GREEN” types - and a ISO rating of 25 - 50 with the “BLUE” types. (I use the LOWER Number in shade and the HIGHER Number in bright sunlight. However.... Only by experimenting to get what YOU want is the crucial point.)

DEVELOPMENT:

OK! So lets say we have come back from an outing where we have just completed about 12 exposed negatives. NOW - It’s back to the darkroom to see what develops.

For films from the 8X10 cameras, I use the “Tray Development” method. However, as the developing formula I have reformulated to develop 4X5's, I use the *“Tank Process*”. In that with the reformulated developer, the time of development is from 4 to 7 minutes (depending on the temperture of the solution). When I have Twelve 4X5 negatives to process the tray development by inspection is really a drag. The total time for each negative would be 4 to 7 minutes. The total time for the whole batch would come to about one hour or one hour and a half. So for me, I shall use the tank method. (*As I currently do not have a large tank for 8X10's I will have to do the tray process when using my 8X10 Camera.*)

NOTE!!!..... >

Do NOT use plastic trays for developing ANY Films. Reason is that the ribs, or depressions, of the trays WILL scratch the emulsion. Particularly that of X-Ray films, as these types of films do NOT have any “protective” coating over the surface. When WET the emulsion is very soft, and therefore, I use a glass “casserole” 9X11" smooth bottom baking dish. The film MUST be handled like you are working with nitroglycerine.

The preparation for development for these films is needed. So, careful cleaning of all surfaces is a must where the contact with the film may occur. I use a sheet of waxedpaper to place them out before going in the holder. Or when taking them out of the holders, just directly go right to the “film-guide separators” in the Tank-Holder.

The Tank I am currently using:

Here is another Below On the right. However - This does NOT have a Lid that closes to keep Out the light. And Must used in the dark or with the Safelight on in the Darkroom.

One of the really nice advantage to using X-Ray Film is the fact that you can do all work under the Safelight. (That IS = If your “safelight” IS truly SAFE?) I use a RED “NEON TAPE” of LED’s that I have tested. I placed a 8X10 sheet of photo paper out on the table where I do my developing. I turned on the LED’s and left it on for 30 minutes. Returning to put the paper into the developer and watched for 5 minutes. It showed nothing. (I will post, at the end of this article, the safelight LED “NEON TAPE” that I use and a link as to where I bought it.

The Tank - And How To Load It:

This “Yankee” 4X5 Tank I Have Used For About 40 Years.
(This Tank Holds a little Over 1.5 Liters)

Open View of The Tank - Showing The Inner Film Slots and To The Right is The Guide

With the Guide In Place, Carefully Slip In The First Sheet of Film.

After The First Sheet is In The First Slot - Move The Guide To The Next Slot, Do It Again. Ect. ect. Till All Sheets Are In.

After loading the tank (no matter now many you have exposed - *I usually wait till I have 12 negatives*) - It will be time to develop.

Most of the time I make about two to three liters of the "*Ansco-30*" X-Ray Developer as a WORKING solution for the use in development. However - NOT as the original formula is written. THAT is for true X-Ray use, and NOT for what we are using it for, it is too strong. So I readjusted the original formula to use in a tank from 4 to 7 minutes. *(On the last few pages I have given this readjusted formula for anyone to make and use.*) I use "*Kodak Indicator Stop*" for 20 seconds, and the Fixer is one that I have also made of Sodium Thiosulfate Permanganate. (This can be purchased at a swimming pool supply store, or online from Amazon for 30 dollars for 10 pounds. This Fixer formula is also on the last pages of this article.)

"Chemicals.... Chemicals .... I Need My Chemicals."

In a previous article (i.e. *"Expanding Your Photographic Chemistry I.Q."*) I have compiled, from different sources, a list of the chemicals used in a "*wet darkroom environment*". It told of what each chemical does, and how they interact with each other to make any developed image. I shall not rehash that here. A well balanced working solution is what is required to produce a good clean, non-fogged film negative.

I check the temperature of the working developer to see if it is 20C. That will indicate that the time of five minutes will go by for full development. Next is the pouring in of the solution and set the timer for 5 minutes. I agitate the tank every minute for 15 seconds. After the time is up, I dump out the Ansco-30, add 1.5 liters of water to rinse, then add the Stop for 20 seconds, and Fixer for 15 to 20 minutes. (*Sodium Thiosulfate Permanganate is NOT a rapid type of Fixer. However it IS one that has been used for over one hundred fifty years of photographic image making. And that is good enough for me.*)

The Developing procedure which I am currently using is this:

1.) In the safe-lighted darkroom area, remove the film sheets from the holders.
2.) Place each sheet into the slots of the film separated carrier of the tank. Place the lid on the tank. - Now you may turn on the normal light.
3.) Set a "Countdown" timer to the desired time according to the temperature of the solutions. (*The warmer the temp. = the FASTER the time.*)
4.) Pour in the developer as fast as it will go without overflowing, or sloshing.
5.) Start the countdown timer.
6.) Agitate every minute for 15 seconds. Lift and "Bang" the tank lightly in the sink. (This will remove micro bubbles from the films in the tank.)
7.) When the timer indicates that the desired time is complete, dump out the developer chemical. Dump it - do not keep it.
8.) Under a running faucet, let cold water run into the tank's opening. ***(Do NOT lift the lid just as yet.***)
9.) Empty the water from the tank, and pour in the Stop solution. Time for this is only 20 seconds - Agitate. (With "*Kodak indicator Stop*" you can tell when it is exhausted, as it will turn a bluish-purple.)
11.) Reset the countdown timer for 15 minutes for *Sodium Thiosulfate fixer*, if that is what you are using. And agitate 30 seconds every two minutes.
12.) Dump the Fixer - Do not keep, as X-Ray films are coated on both sides, and this amount of unused silver halides is rather too much and the Fixer is not strong enough to use again. Besides - *Sodium Thiosulfate Permanganate* is rather cheap.
13.) Place the tank under the running faucet, and let the water overflow the tank. Now you can open the lid and expose the contance to normal light. But let the water run for a few more minutes.
14.) Dump out the water. But refill to just over the film sheets, add a few drops of "*Kodak Photo-Flow*", or a few drops of dish washing detergent ("*Dawn*" or some equivalent.) Agitate lightly.
15.) Hang on a prepared "Dry-Line" in a dust free environment to drip dry. Do NOT wipe dry. Remember = X-Ray films are very easily scratched.

Remove Developed Negative From The Tank
(Hang On A "Dry-Line" Where There Is No Dust)

Twelve Negatives Hanging on "The Dry-Line"

Here are a few of the X-Ray Negatives with the Scanned Positives from this batch:

Fuji X-Ray "Green" - ISO= 50
4X5 - 150mm/5.6-f Lens
No Filter / f-11 @ 1 Sec.
Indoor LED Lights (Left & Right)
Dev Ansco-30/JK - Reg. Stop & Fixer

Fuji X-Ray "Green" - ISO= 50
4X5 - 127mm/4.7f Lens
No Filter / f-16 @ 1 Sec.
Dev Ansco-30/JK - Reg. Stop & Fixer

The samples above were scanned with an Epson model 4990 film scanner - The light edits and cropping was done in Photoshop "CS-5". To process the positives in CS-5 I inverted the negatives to a Positive and with the "Color and Saturation sliders" took them to zero.

Scanning, Copying, Printing, And Displaying:

Scanning your X-Ray negatives is about the easiest way to be able to invert to a positive and print the positive at home, or send out. When I scan I use a Epson model 4990. This scanner is equipped with two modes, one is "Reflective" for all general purposes, and "Film Mode". It will scan all films up to 8X10 inch negatives, as it has a "Light Through" lid, which lets light pass through the negative to the sensors. My preferred resolution is 1200 DPI. (*TIF files - yeah! I know these are LARGE. - Good*!) I usually take that size down to 600 for editing and after, reduce it to 300 for printing - Still a TIF file. (I only use jpg for posting on line or for placing on PDF's.)

Another method is to simply use a digital camera of a contact print. And the more practical is the use of an enlarger - the more conventual way. I do have a Durst "Laborator 138 S" 4X5 enlarger, however I like the conveyance of scanning and printing on a Canon Pro-100 up to 13X19 inch prints. I have sent digital files out to have larger prints up to 40X60 inches.

For posting on any web-based "page", (Flicker, Facebook, or whatever) the physical size is that of 4X5. I usually place a small "toned-down" watermark, and the resolution is that of 72 DPI. (*Facebook has a way of really messing up a good print anyway - so "high quality" on that thing is not to be found.*)

A little more about the chemicals I use:

"***Photographers Formulary***" is my goto place for just about all of my supply of chemicals.
https://stores.photoformulary.com/bulk-chemicals/

There are other outlets online as well, but I like the "Formulary". Also there are a few places in cities that do carry some of the chemicals needed in photography. Health food stores, beauty supply stores, swimming pool supply stores. (I get my Sodium Thiosulfate Permanganate from a pool supply store. (And online through Amazon 30 bucks for a 10 pound bag.)

When I am using Sodium Thiosulfate for fixing X-Ray film I put in a little Aluminum Potassium Sulfate (Alum) just before pouring it into the tank. This is a hardener, and helps prevent light scratches on the emulsion when handling.

"NEON Tape Safe Light" =
KKOANA 12V Flexible Sign Neon Lights Silicone Tube LED Strip Waterproof 5M+Power Supply (Red)

Here is the Ansco-30-JK reformulated “Tank Developer Solution”.

Water - at 120 Degrees F. ----------750ml.
Metol ---------- 3.0 Grams. (Reduced)
Sodium Sulfite ---------- 70.0 G. (Increased)
Hydroquinone ---------- 4.0 G. (Reduced)
Sodium Carbonate ---------- 20.0 G. (Reduced)
Potassium Bromide ---------- 5.5 G. (Increased)

Cold water to make a Full 1 liter of Solution. (STOCK solution.)

For a working solution --

Take One Part of this Stock to 24 Parts of Water. That is a 1:25 Ratio.

The times will vary with the temperture of the working solution,
anywhere from four to seven minutes.
(20 Degrees C. = 5 minutes)

Sodium Thiosulfate Permanganate Fixer
-0-
For every One Liter of Hot water weigh out 100 Grams of Sodium Thiosulfate.
Use this - it is not necessary to dilute.

ID - Notch Codes:

The film does not have the typical “Notch Codes” that is common on true films. Reason being is that the X-Ray films are double sided emulsion, it is impossible to get this stuff wrong when inserting into film holders. Looking at my examples on a previous page, one does see little “marks” on the right side of the negatives. I have taken a tip from another large format photographer and cut “filed” little marks on my holder’s closer flaps. These marks are to identify the number of each exposure as to correspond with my ***exposure notes*** when taking the images. In this manner - I know that each negative will have information to later type on the scanned negative as to what is what, from my “Exposure Card” or Notebook.

Reading List:

There is really no way to get around READING. It is a must for anyone that is seeking to learn just about anything. Even by watching a “YouTube”, and there are plenty really great VID’s out there. By reading you stimulate your brain. So... Here Ya Go!:

If you do not have a copy of ***“The Darkroom Cookbook”, by Steve Anchell*** - by all means get a hard copy of this book.

I have a lot of PDF's that I have compiled and I shall freely give them to anyone who would make a request to have them. (I read them on my "*Kindle*" anywhere.) Best to read anything on a computer screen, a "tablet" or Kindle, other than an "***iFart-Phone"***.

If you want to get really "involved" in the chemistry of the photographic process - there are a few books to be had by Dr. Kenneth Mees. (One time head chemist at Eastman - Kodak). He was one really great man of science. There are more technical books about photographic chemistry as well, it all depends on how far you wish to travel that "road". Me = Well I want it all.

Here is how to make the ID "Notch Codes" on the film holders:

https://www.jbhphoto.com/articles/film-holder-numbering/

Thank you for reading this article. Please know that this is only My Way of a process to handle X-Ray films. There are different ways that other photographers use to make their images. All are good. I suggest that you find your way. Read EVERYTHING. Watch all the YouTube VID's that pertain to the use of X-Ray Film Development. Above all - Experiment on your own, keep NOTES in a Hand Written NOTEBOOK. When you find your way to work with these low cost films, you too shall be able to produce very fine positives from X-Ray Film Negatives.

May The Light Be With You.....

James R. Kyle, Photographer
Saint Louis, Missouri, U.S. of A. - Planet Earth - Milky Way Galaxy.